1,180,638

PATENT SPECIFICATION

DRAWINGS ATTACHED

1,180,638

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Date of Application (No. (41364/67) and filing Complete Specification: 11 Sept., 1967.

Complete Specification Published: 4 Feb., 1970.

Index at acceptance:—A6 D11D

International Classification:—A 63 b 57/00

COMPLETE SPECIFICATION

Golf Tee Apparatus

We, FOUR SQUARE ENTERPRISES LIMITED, a British Company of Parkside Works, Parkside, Cheam, Surrey, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a golf-tee apparatus.

The invention is suitable for use both indoors and outdoors in golf ranges.

In accordance with the invention there is provided a golf tee apparatus comprising a tee mounted for vertical movement between uppermost and lowest positions, a pneumatically-operated piston and cylinder device for imparting such movement to the tee, and a control valve for alternatively connecting opposite ends of the cylinder of such device to a pressure source and exhaust, means for feeding balls individually to the tee when lowered and means for controlling the rate at which the tee rises towards its uppermost position.

Conveniently, the apparatus may include means for sensing when a ball has been driven off the raised tee whereby to initiate a cycle of reciprocation of the tee from its raised position to its lowered position and back to its raised position.

In order that the invention may be more clearly understood three embodiments thereof are described hereinafter with reference to the accompanying drawings, in which:—

FIGURE 1 is a side elevation of a golf tee apparatus with associated pneumatic circuitry represented schematically;

FIGURE 2 is a view similar to Figure 1 of a modification; and

FIGURE 3 is a view also similar to Figure 1 of a further modification.

Referring to Figure 1, a vertically movable piston rod 1 has a bracket 2 on its top free end which rigidly supports a yoke 3. A resilient tee 4 is tiltably supported on trunions 5 within the yoke and near the lower end of the tee. An arcuate value actuating arm 6 is rigidly supported on and at the lower end of the tee 4 so as to be tiltable therewith. The bracket 2, together with the yoke 3, also rigidly supports an upstanding wall 7 between which and the tee 4 is a light compression spring 8 for urging the tee into a vertical position, as shown in full lines, against a stop (not shown). The wall 7 in turn rigidly supports a cradle 9 from which a gate wall 10 depends vertically. The apparatus also includes a chute 11 and two spring biased gates 12 between which the cradle 9 can move.

The pneumatic circuitry includes a source 13 of compressed air leading via a line 14 to a valve 15. Other connections to this valve include a line 16 to exhaust and a line 17. The valve when relaxed interconnects lines 17 and 16 (dash-dash line) or alternatively on depression of a button 18 by the arm 6, interconnects lines 14 and 17, (dot-dash line). The line 17 leads to another valve 19 having connections to lines 20 and 21. The valve 19 when relaxed interconnects lines 17 and 21 (dash-dash line) or alternatively on depression of a foot-operated button 22 interconnects lines 20 and 21 (dot-dash line). The line 20 is a branch from the line 14.

The line 21 leads to another valve 23 which is bistable under the influence of pressure applied alternatively through the line 21 or through a line 24. The valve 23 has connections with five lines, 25 to 29 inclusive and under the influence of pressure applied through the line 21 respectively interconnects lines 25 and 28 and lines 27 and 29 (dot-dash lines). Alternatively, under the influence of pressure in the line 24 the valve respectively interconnects lines 25 and 29 and lines 26 and 28 (dash-dash lines). The line 24 leads to a pressure switch 30, the line 25 is a branch from the line 14, the lines 26 and 27 lead to exhaust and the lines 28 and 29 lead respectively via one-way regulators 31 and 32 to the upper and lower ends of a cylinder 33.

The pressure switch 30 also has connections with lines 34 and 35 and when relaxed interconnects lines 24 and 35 (dash-dash) line. Alternatively, under the influence of a pressure signal delivered through a line 36 the valve interconnects lines 24 and 34 (dot-dash line). The line 34 is in turn a branch from the line 14 and the line 35 leads to exhaust. The line 36 leads to a reservoir 37 to which is also connected a line 38 leading, via a one-way flow regulator 39, to a junction in the line 28 between the valve 23 and the flow regulator 31.

The apparatus is at rest with the tee 4 vertical and in its highest position and the valve 23 in its dash-dash position with pressure air supplied from lines 14 and 34 to the line 24 while the pressure switch 30 is in its relaxed dash-dash position. Further pressure air is supplied from the line 25 to the line 29 via the dash-dash connection in the valve 23. The line 28 is open to the exhaust line 26 via the dash-dash connection in the valve 23 and since the line 36 is connected to the line 28 via the reservoir 37 and the line 38 this line is also connected to exhaust. The line 21 is connected to exhaust line 16 via the dash-dash connection in the relaxed valve 19, the line 17 and the dash-dash connection in the relaxed valve 15.

If there is a ball 40 on the tee 4 the propulsive force applied to the ball during the action of driving it from the tee tilts the same to the dash-dash position against the light spring 8 so that the button 18 is momentarily depressed by the arm 6. Thus a pressure signal is delivered to the line 21 from the line 14 via the dot-dash line in the valve 15, the line 17 and the dash-dash connection in the valve 19. This causes the connections in the valve 23 to change from the dash-dash lines to the dot-dash lines so that pressure is delivered from the line 25 to the line 28 and the line 29 is open to the exhaust line 27. This will cause the now erect tee to be lowered at a rate controlled by the flow regulator 32.

Since the line 28 is under pressure, air is supplied to the line 38 and passes through the flow regulator 39 at a controlled rate and into the reservoir 37 via the line 38. Pressure in the reservoir and thus in the line 36 gradually increases to a predetermined value whereupon the pressure switch 30 is operated to change from the dash-dash position to the dot-dash position. This releases the pressure in the line 34 into the line 24 so that the valve 23 returns to its dash-dash position. Pressure is now delivered from the line 25 to the line 29 and the line 28 is open to the exhaust line 26. The result of this is twofold: it causes the tee to rise again at a rate controlled by the flow reducer 52 to a line 53 which in turn is conhaust line 26, via the reservoir 37, the line 38 and the flow regulator 39 and part of the line 28 whereby the pressure switch 30 is allowed to retur: to its relaxed condition.

The flow regulators 32 and 31 serve to slow down the lowering and raising respectively of the tee 4 and the regulator 39 and the reservoir 37 provide a delay between such lowering and raising. This is desirable in order to allow feeding of the balls from the chute into the tee 4 and the retention of the individual balls on the tee when the latter reaches its upper position. Delivery of the balls from the chute 11 onto the tee is effected in two stages. Thus, in each cycle, a ball rolls from the chute 11 onto the cradle 9 whilst a ball which has rolled onto the cradle during the preceding cycle is deposited on the tee. Starting from the full-line position of Figure 1, the tee begins to descend after the ball 40 is driven off. During this lowering of the tee, the ball 42 deposited on the cradle during the preceding cycle is prevented from descending with the cradle by the gates 12. When the tee 4 reaches its lowest position the gate wall 10 no longer obstructs balls on the chute 11 and a ball 41 on the chute 11 is allowed to roll onto the empty lowered cradle 41, as shown in broken lines. The ball 42 retained by the gates 12 is at the same time allowed to roll onto the lowered tee. During the subsequent upward movement of the tee, the ball 41 on the cradle is allowed to pass through gates 12. When the tee 4 reaches its uppermost position the ball 41 assumes the previous position of the ball 42 and the latter assumes the previous position of the ball 40.

If there is no ball 40 on the tee 4 the cycle of operation can be initiated either by gently tilting the tee with one's foot or alternatively by a momentary depression of the button 22 whereby to deliver a pressure signal to the line 21 via the line 20 and the dot-dash line in the valve 19.

Referring to Figure 2 wherein like parts are identified by the same reference numerals as in Figure 1, the tee 4 is mounted on a leaf 43 pivoted at 44 to a side extension 45 of the bracket 2. The leaf 43 is apertured freely to receive a pin 46 upstanding from the extension 45 and having an enlarged head 47 between which and the leaf 43 is a light compression spring 48. Between the bracket 2 and a tab 49 on the leaf 43 near the pivot 44 is a light tension spring 50. An orifice 51 is provided in the extension 45 and the springs 48 and 50 are so adjusted that when the ball 40 is on the tee 4 the leaf closes the orifice 51 but when there is no ball on the tee the leaf opens the orifice.

The pressure line 14 leads via a pressure reducer 52 to a line 53 which in turn is connected to the valve 19. The valve 19 also has connections to a line 54 leading to the orifice 51, and a blanked-off line 55. In its relaxed state the valve interconnects the lines 53 and 54 (dash-dash line) while when the button 22 is depressed the line 53 is connected to the line 55 (dot-dash line). A line 56 branches

from the line 53 and leads to one side of a low-pressure actuated diaphragm in a housing 57, while the other side of the diaphragm is connected to an exhaust line 58. The diaphragm is provided to actuate a valve 59 against the action of a return spring.

A line 60 branches from the line 14 and leads to the valve 59 which has other connections 61 to 64 inclusive, the lines 61 and 62 leading respectively to the bottom and the top of the cylinder 33, while the lines 63 and 64 lead to exhaust, the latter through a one-way pressure regulator 65. When pressure is applied to the line 56 the valve 59 is in the dash-dash position whereas when the line 56 is exhausted the valve 59 is in the dot-dash position.

As before, the tee 4 is in its uppermost position when the apparatus is at rest with the ball 40 on the tee. Driving the ball from the tee 4 causes the leaf 43 to open the orifice 51 so that the line 56 is exhausted via the line 53, the dash-dash line in the valve 19 and the line 54. This allows the return spring in the valve 59 to change the connection from the dash-dash lines to the dot-dash lines so that pressure is applied to the line 62 from the line 60 and the line 61 is connected to the exhaust line 63. This causes the tee 4 to be lowered.

When the tee 4 reaches its lowest position it receives the ball 42 in the same way as described above and the extra weight of this ball causes the leaf 43 to close the orifice 51. This has the result that after a certain delay the pressure in the line 56 becomes such as to operate the diaphragm against the return spring. The valve 59 then returns to its dash-dash position from its dot-dash position so that pressure from the line 60 is delivered to the line 61 and the line 62 is connected to the exhaust line 64. The tee then rises at a rate controlled by the flow regulator 65, carrying the new ball 42 ready for driving off.

If no ball is fed onto the lowered tee 4 the same will assume a position of rest in its lowest position. In order to initiate a cycle of operation under such a condition the button 22 is depressed. This has the result of changing the valve 19 from the dash-dash position to the dot-dash position so that pressure is applied to the line 56 and the tee 4 rises and remains in its uppermost position until the button 22 is released.

A simpler embodiment is shown in Figure 3 wherein again like parts are identified by the same reference numerals as in Figure 1. In this embodiment the tee 4 is rigidly mounted on the bracket 2 and the pressure line 14 leads to a valve 66 which is spring-biased into the dash-dash position but is movable into the dot-dash position by depression of a foot-operated button 67. In the dash-dash position of the valve 66 the line 14 is connected with a line 68 leading to the bottom of the cylinder 33 and a line 69 from the top of the cylinder is connected to an exhaust line 70 including a one-way flow regulator 71. In the dot-dash position of the valves 66 the line 14 is connected to the line 69 and the line 68 is connected to another exhaust line 72.

The apparatus is at rest with the tee 4 in its uppermost position and after driving the ball 40 therefrom it is necessary to depress the button 67 for a period sufficient not only to change the valve 66 from its dash-dash position to its dot-dash position whereby pressure is applied to the line 69 and the line 68 is connected to the exhaust line 72 but also to allow time for the tee 4 to be lowered and provide a delay at the lowest position of the tee long enough to enable the ball 41 to be transferred from the chute 11 onto the lowered cradle 9 and to enable the ball 42 to be transferred from the gates 12 to the lowered tee. When the button 67 is released the valve 66 reverts to its dash-dash position so that the line 68 is put under pressure and the line 69 is connected to the exhaust line 70. This causes the tee 4 to rise carrying the ball 42 at a rate controlled by the flow regulator 71.

It will be understood that there will be a supply of balls on the chute 11 and this supply can be governed either on a quantity or time basis under the control of a coin-operated device or a central console.

WHAT WE CLAIM IS:—

1. A golf tee apparatus comprising a tee mounted for vertical movement between uppermost and lowest positions, a pneumatically-operated piston and cylinder device for imparting such movement to the tee, a control valve for alternately connecting opposite ends of the cylinder of such device to a pressure source and exhaust, means for feeding balls individually to the tee when lowered and means for controlling the rate at which the tee rises towards its uppermost position.

2. Apparatus according to claim 1, including means for sensing when a ball has been driven off the raised tee whereby to initiate a cycle of reciprocation of the tee from its raised position to its lowered position and back to its raised position.

3. Apparatus according to claim 2, wherein the tee is arranged to be responsive to the propulsive force applied to the ball during driving off.

4. Apparatus according to claim 2, wherein the tee is arranged to be responsive to the loss of weight resulting from the ball being driven off from the tee.

5. Apparatus according to claim 3, wherein the control valve is actuated by air pressure and the response of the tee to the action of driving off a ball is effective to deliver a pressure signal to actuate the control valve.

6. Apparatus according to claim 4, wherein the control valve is actuated by air pressure and the response of the tee to the removal

of a ball from the tee by the action of driving off is effective to exhaust an actuating connection to the valve whereby to reset the valve.

7. Apparatus according to claim 5, including a flow regulator and a reservoir effective to produce a delay before the control valve is reset.

8. Apparatus according to any of claims 2 to 7, including a manually operable valve for initiating a cycle of operation.

9. Apparatus according to claim 1, wherein the control valve is manually operable.

10. Apparatus according to any preceding claim, wherein the arrangement for feeding the balls includes a chute, a gate wall and cradle movable with the tee and ball transfer gates, the gate wall being operative to close the chute when the tee is raised and to open the chute and allow a ball to be transferred from the chute into the cradle when the tee is lowered, and the ball transfer gates being operative to allow a ball on the cradle to pass between the gates when the tee is raised and to allow such ball to be transferred from the gates onto the tee when the tee is lowered.

11. A golf tee apparatus substantially as hereinbefore described with reference to, and as shown in, Figure 1 of the accompanying drawings.

12. A golf tee apparatus substantially as hereinbefore described with reference to, and as shown in, Figure 2 of the accompanying drawings.

13. A golf tee apparatus substantially as hereinbefore described with reference to, and as shown in, Figure 3 of the accompanying drawings.

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Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1970.
Published by the Patent Office, 25 Southampton Buildings, London, W.C.2, from which copies may be obtained.

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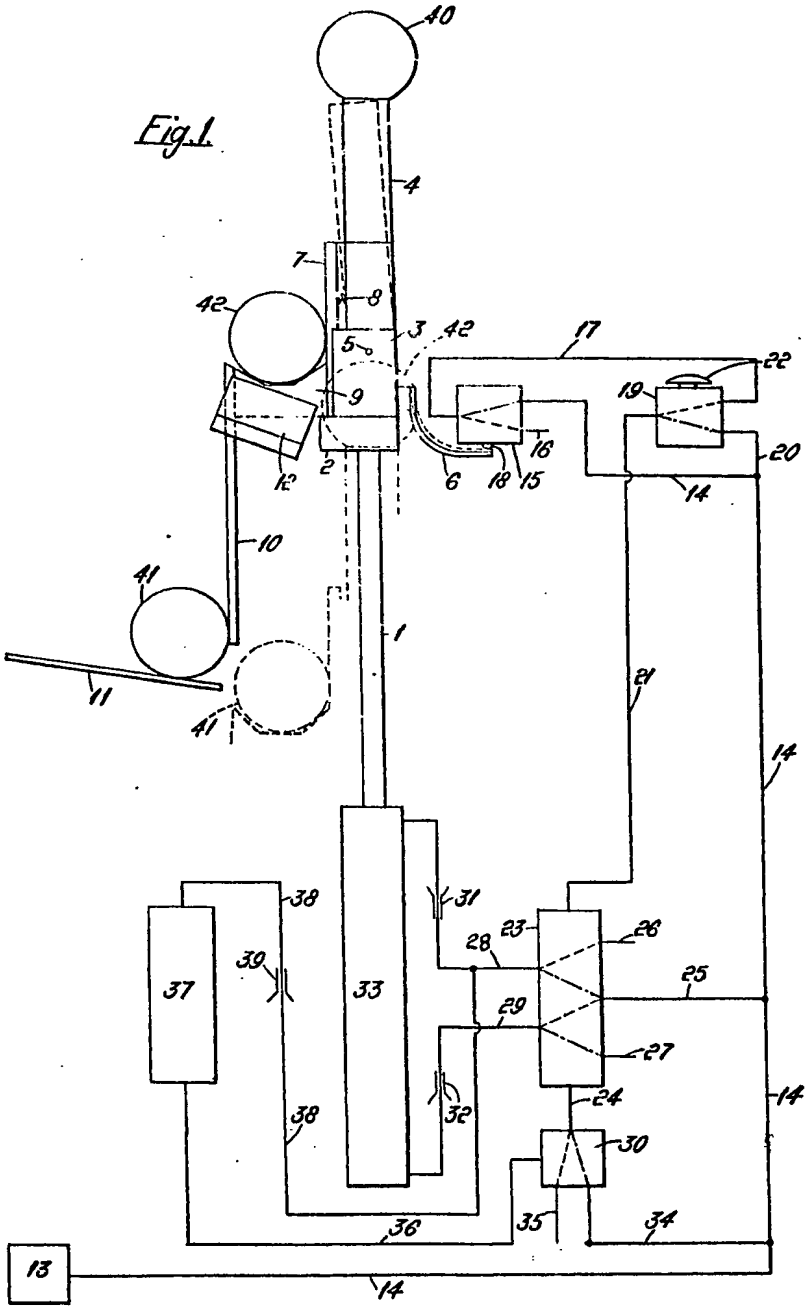
3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

Fig.1.



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Sheet 2

Fig.2

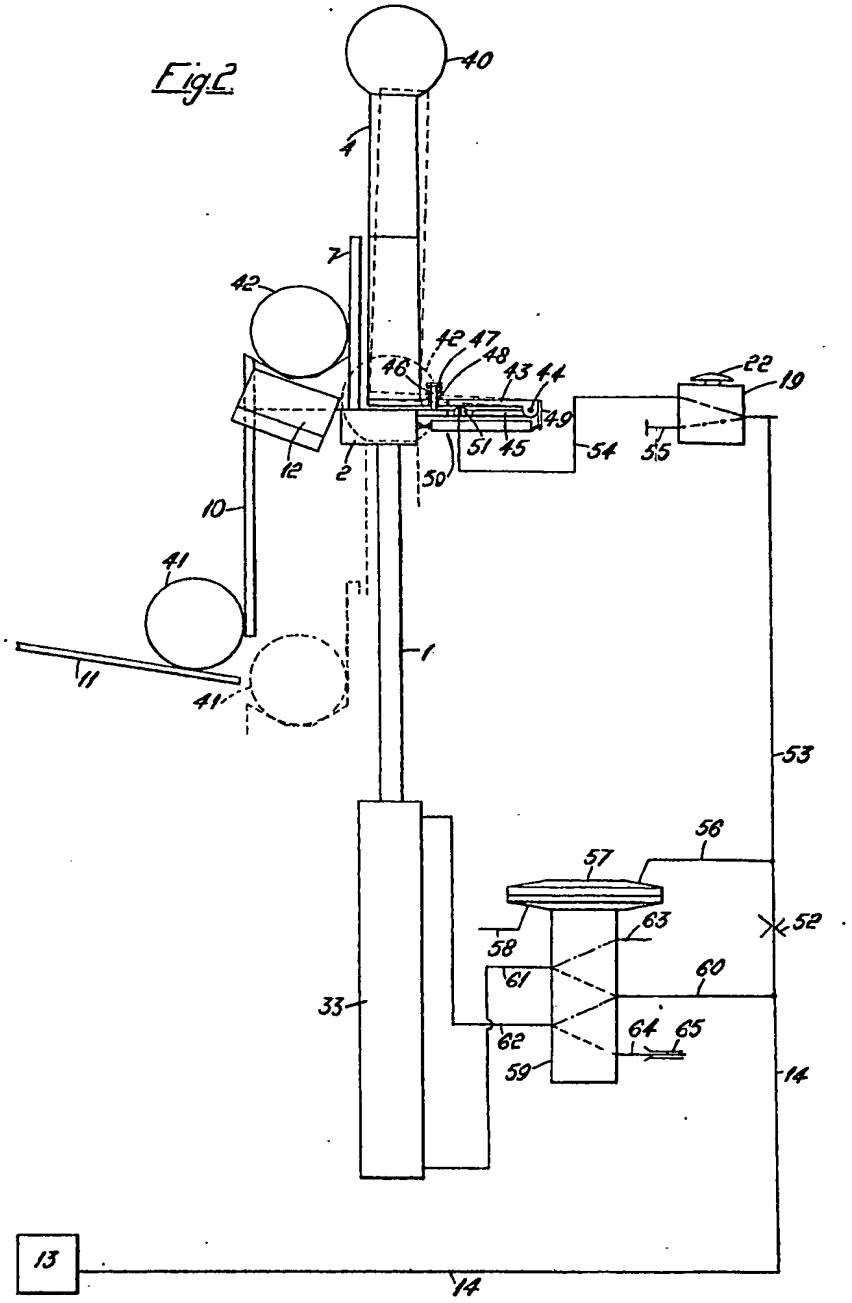

Fig.3